

### **REMARKS**

Claim 18 is amended. Claim 23 is cancelled. Claims 1-22 and 24-31 are pending in the application.

Claim 23 stands rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Examiner states that the recited second oxidizer comprising hydrogen peroxide is confusing since the first oxidizer is hydrogen peroxide. Without admission as to the propriety of the Examiner's rejection, claim 23 is cancelled.

Claims 1-4, 6-9, 11-22 and 24-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Stauf, U.S. Patent No. 6,277,436 B1 in view of Senzaki, U.S. Patent No. 6,238,734 B1. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. Claims 1-4, 6-9 and 11-31 are allowable over the cited combination of Stauf and Senzaki for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every limitation in any of those claims.

Independent claim 1 recites a method of forming a barium strontium titanate (BST) layer comprising simultaneously providing gaseous barium and strontium within a reactor, providing gaseous titanium within the reactor and flowing at least one gaseous oxidizer comprising H<sub>2</sub>O to the reactor. As acknowledged by the Examiner at page 3 of the present action Stauf does not disclose or suggest the recited oxidizer comprising H<sub>2</sub>O. Furthermore, Stauf does not disclose or suggest the claim 1 recited flowing the oxidizer

comprising  $H_2O$  to the reactor while simultaneously providing gaseous barium and strontium and providing gaseous titanium within the reactor.

As discussed in applicant's response to the Office Action dated April 30, 2002, and as further acknowledged by the Examiner in the present action at page 7, Senzaki fails to disclose or suggest the claim 1 recited forming a barium strontium titanate layer. Further, Senzaki does not disclose or suggest the claim 1 recited providing gaseous barium and strontium within a reactor, or the recited simultaneously providing gaseous barium and strontium, providing gaseous titanium and flowing at least one gaseous oxidizer comprising  $H_2O$ . As combined, Stauf and Senzaki fail to disclose or suggest the claim 1 recited simultaneously flowing at least one gaseous oxidizer comprising water and providing gaseous barium and strontium within a reactor. Additionally, as combined Senzaki and Stauf fail to disclose or suggest the claim 1 recited method comprising simultaneously providing gaseous barium and strontium, providing gaseous titanium and flowing at least one gaseous oxidizer comprising water. Accordingly, independent claim 1 is not rendered obvious by the cited combination of Stauf and Senzaki and is allowable over these references.

Dependent claims 2-4 and 25-26 are allowable over the combination of Stauf and Senzaki for at least the reason that they depend from allowable base claim 1.

Independent claim 6 recites a method of forming a BST layer comprising simultaneously providing gaseous barium and strontium by flowing at least one metallic organic precursor to the reactor, providing gaseous titanium within the reactor and flowing at least one gaseous oxidizer comprising  $H_2O_2$ . Independent claim 6 is allowable over the cited combination of Senzaki and Stauf for at least reasons similar to those discussed

above with respect to independent claim 1, such reasoning being equally applicable to the recited oxidizer comprising  $H_2O_2$ . Dependent claims 7-9 and 27-28 are allowable over the cited combination of Senzaki and Stauf for at least the reason that they depend from allowable base claim 6.

Independent claim 11 recites a method of forming a BST layer comprising simultaneously providing gaseous barium and strontium, providing gaseous titanium, and flowing gaseous oxidizers wherein the oxidizers comprise  $H_2O$ . Independent claim 11 is allowable over the cited combination of Senzaki and Stauf for at least reasons similar to those discussed above with respect to independent claim 1. Dependent claims 12-17 and 29-30 are allowable over the cited combination of Stauf and Senzaki for at least the reason that they depend from allowable base claim 11.

With respect to independent claim 18, such recites a method of forming a BST layer comprising simultaneously providing gaseous barium and strontium within a reactor by flowing at least one metal organic precursor to the reactor, providing gaseous titanium within the reactor and flowing gaseous oxidizers comprising  $H_2O_2$  to the reactor. As amended independent claim 18 further recites one or more of the at least one metal organic precursor comprising a  $\beta$ -diketonate ligand selected from the group consisting of thd, methd, and dmp. The amendment to independent claim 18 is supported by the specification at, for example, the paragraph spanning pages 5 and 6. Independent claim 18 is allowable over the cited combination of Senzaki and Stauf for reasons similar to those discussed above with respect to independent claim 6. Additionally, applicant notes that Senzaki specifically discloses developing methods of forming mixed metal compound layers by direct liquid injection in the absence of  $\beta$ -diketonate substituents "to avoid solvent

and ligand exchange drawbacks” and to “avoid conditions leading to solid conditions” encountered when  $\beta$ -diketonate substituents are utilized (col. 2, ll. 42-57). Accordingly, Senzaki specifically teaches away from utilization of the independent claim 18 recited utilization of  $\beta$ -diketonate ligands and therefore cannot be properly combined as a basis of an obviousness rejection of independent claim 18 (MPEP § 2145).

Dependent claims 18-22, 24 and 31 are allowable over the cited combination of Stauf and Senzaki for at least the reason that they depend from allowable base claim 18.

Claims 5 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable

over Stauf in view of Senzaki and in further view of Kang, U.S. Patent No. 6,127,218. As

discussed above independent claims 1 and 6 are not rendered obvious by the combination

of Stauf and Senzaki. Kang discloses methods of forming a ferroelectric film utilizing a first

oxidant and a second oxidant. The Kang disclosure does not disclose or suggest the claim

1 and 6 recited simultaneously providing gaseous barium and strontium within a reactor;

providing gaseous titanium within a reactor and flowing at least one gaseous oxidizer to the

reactor. As combined, Senzaki, Stauf and Kang fail to disclose or suggest the claim 1

recited simultaneously providing gaseous barium and strontium, providing gaseous titanium

and flowing at least one gaseous oxidizer comprising water or comprising H<sub>2</sub>O to form a

BST layer. Accordingly, independent claims 1 and 6 are not rendered obvious by the cited

combination of Kang, Stauf and Senzaki. Dependent claims 5 and 10 are allowable over

the cited combination of Senzaki, Kang and Stauf for at least the reason that they depend

from corresponding base claims 1 and 6.

Claims 1-4, 6-9 and 11-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Stauf in view of DiMeo, U.S. Patent No. 5,972,430. As discussed above

and as acknowledged by the Examiner at page 5 of the present action, Stauf fails to disclose or suggest the recited provision of gaseous barium and strontium within a reactor by flowing at least one metal organic precursor while simultaneously providing gaseous titanium within the reactor and flowing at least one gaseous oxidizer comprising H<sub>2</sub>O or comprising H<sub>2</sub>O<sub>2</sub>. As set forth in applicant's response to the Office Action dated December 19, 2001 and as acknowledged by the Examiner as set forth at page 6 of the action dated April 30, 2002, DiMeo teaches away from the recited precursors and oxidizers being providing simultaneously. Accordingly, DiMeo cannot be properly combined as the basis of a § 103 rejection against the present claims. Claims 1-4, 6-9 and 11-31 are therefore not rendered obvious by the cited combination of Stauf and DiMeo and are allowable over these references.

Claims 5 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Stauf as combined with DiMeo and Kang. As discussed above, DiMeo cannot be properly combined as basis for a 103 rejection of the currently pending claims. As further discussed above, claims 5 and 10 are not rendered obvious by the combination of Stauf and Kang and are allowable over these references. Accordingly, claims 5 and 10 are allowable over the cited combination of Stauf, DiMeo and Kang.

For the reasons discussed above claims 1-22 and 24-31 are allowable. Accordingly, applicant respectfully requests formal allowance of pending claims 1-22 and 24-31 in the Examiner's next action.

Respectfully submitted,

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Group Art Unit..... 1762  
Examiner ..... Fuller, Eric B.  
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Title: Chemical Vapor Deposition Methods of Forming Barium Strontium Titanate  
Comprising Dielectric Layers

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO AUGUST 13, 2002 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and  
~~strikeouts~~ indicate deletions.

18. (Amended) A chemical vapor deposition method of forming a barium  
strontium titanate comprising dielectric layer, comprising:  
positioning a substrate within a chemical vapor deposition reactor; and  
simultaneously a) providing gaseous barium and strontium within the reactor by  
flowing at least one metal organic precursor to the reactor, one or more of the at least one  
metal organic precursors comprising a  $\beta$ -diketonate ligand selected from the group  
consisting of thd, methd, and dmp, b) providing gaseous titanium within the reactor, and  
c) flowing gaseous oxidizers to the reactor under conditions effective to deposit a barium  
strontium titanate comprising dielectric layer on the substrate, the oxidizers comprising at  
least H<sub>2</sub>O<sub>2</sub> and at least another oxidizer selected from the group consisting of O<sub>2</sub>, O<sub>3</sub>, NO<sub>x</sub>,  
and N<sub>2</sub>O, where "x" is at least 1.

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